Amendments to the Claims

The listing of claims will replace all prior versions, and listings of claims in the application.

1-12 (Cancelled)

13. (Currently Amended) A device manufacturing method, comprising:

emitting a beam of radiation using an illumination system;

imparting to the beam a pattern in its cross section;

projecting the patterned beam of radiation onto a target portion of a surface of a substrate;

measuring a first respective temperature of a first plurality of regions in the target portion of the substrate;

measuring a second respective temperature of a second plurality of regions in the target portion of the substrate;

calculating a dimensional response from differences between measurements of the first and the second respective temperatures of the first and the second plurality of regions of the substrate; and

<u>concurrently</u> adjusting<u>, in real time,</u> one or more spatial characteristics of the patterned beam relative to a substrate support to compensate for the calculated dimensional response, wherein the spatial characteristics comprise a cross-sectional shape of the patterned beam, a position of the patterned beam, and a size of the patterned beam.

14. (Previously Presented) The method according to claim 13, wherein the first and the second respective temperature is measured at the first and the second plurality of regions distributed across the surface of the substrate.

15. (Previously Presented) The method according to claim 13, wherein the first and the second respective temperature is measured with a plurality of sensors distributed across the substrate support and each of the plurality of sensors sense an additional temperature of an adjacent region of the substrate.

16. (Previously Presented) The method according to claim 15, wherein:

the plurality of sensors are distributed on a sensor support located above the substrate support;

the substrate support and the plurality of sensors are displaced relative to each other; and

the additional temperature of regions of the substrate adjacent each of the plurality of sensors are measured at each of a plurality of relative positions between the substrate support and the sensor support.

17. (Original) The method according to claim 16, wherein the plurality of sensors are supported on a stationary frame located above the substrate support and the substrate support is displaced beneath the frame.

18. (Original) The method according to claim 17, wherein the substrate support is displaced in a predetermined direction and the sensors are supported in a linear array extending transverse to the said direction.

19. (Previously Presented) The method according to claim 13, further comprising:

generating a map of an overall temperature across the substrate;

developing a model of the dimensional response of the substrate in a substrate-support coordinate system;

generating a substrate position map that represents a change in position of points on the substrate relative to the substrate support coordinate system given the map of the overall temperature across the substrate and the model of the dimensional response; and

adjusting the spatial characteristics of the patterned beam in accordance with the substrate position map to compensate for the dimensional response.

20-22 (Cancelled)

23. (Previously Presented) A method, comprising:

measuring a first set of temperatures, wherein each temperature corresponds to the temperature at a first different respective regions of a substrate;

forming a first pattern of alignment features at the first different respective regions of the substrate having the measured first set of temperatures during an exposure of the substrate;

measuring a first set of spatial distributions of the first pattern of alignment features of the substrate occurring during the first set of temperatures;

measuring a second set of temperatures, wherein each temperature in the second set corresponds to a second different one of the respective regions of the substrate;

forming a second pattern of alignment features at the second different respective regions of the substrate having the measured second set of temperatures during a subsequent exposure of the substrate;

measuring a second set of spatial distributions of the alignment features occurring during the second set of temperatures; and

determining a dimensional response from differences between measurements of the first set of spatial distributions and measurements of the second set of spatial distributions.

24. (Original) The method according to claim 23, wherein:

the substrate is a reference substrate which is one of a class of substrates having similar physical characteristics and which are to be processed in a lithographic apparatus;

the spatial distribution of the alignment features of the reference substrate is measured when the reference substrate is supported on a substrate support of the lithographic apparatus;

a member of the class of substrates is subsequently placed on the substrate support;

the temperature of the substrate supported on the substrate support is measured at each of a plurality of regions distributed across a substrate surface; and

processing of the substrate is adjusted based on correlating a change in the substrate dimensions with a dimensional response model derived from the reference substrate.

25. (Cancelled)

26. (Cancelled)

27. (Previously Presented) The method according to claim 23, further comprising:

causing the first and second patterns to have a same nominal spatial distribution with a nominal offset between the two patterns; and

deriving the dimensional response model from differences between nominal and measured offsets between features of the two patterns.

28. (Previously Presented) The method according to claim 23, further comprising:

forming the first pattern on a reference substrate that is one of a class of substrates having similar physical characteristics and which are to be processed in a lithographic apparatus;

forming the second pattern on the reference substrate by exposing a layer of resist supported on the reference substrate in the lithographic apparatus;

measuring the differences between the nominal and measured offsets within the lithographic apparatus; and

washing the exposed resist off the reference substrate to enable re-use of the reference substrate.

29. (Previously Presented) The method of claim 24, comprising:

adjusting one or more spatial characteristics of a patterned beam used to form the first and the second patterns relative to the substrate support to compensate for the determined dimensional response, wherein the spatial characteristics comprise a cross-sectional shape of the patterned beam, a position of the patterned beam, and a size of the patterned beam.

30. (Previously Presented) The method of claim 29, wherein the adjusting comprises:

adjusting a magnification of the patterned beam.

31. (Previously Presented) The method of claim 24, wherein the measuring the first and the second set of temperatures comprises:

positioning a plurality of sensors, arranged in a linear array extending transversely relative to a direction in which the substrate support is displaceable, to measure the first and the second sets of temperatures, wherein each of the plurality of sensors sense the temperature of an adjacent region of the substrate.

32. (Previously Presented) The method of claim 23, further comprising:

generating a map of an overall temperature distribution across the substrate; and

generating a substrate position map that represents a change in position of points on the substrate relative to a substrate support coordinate system given the map of the overall temperature across the substrate and the determined dimensional response.

33. (Currently Amended) A lithographic apparatus, comprising:

a temperature measuring system to measure a first and a second set of temperatures, wherein each temperature in the first set corresponds to the temperature at a first different respective regions of a substrate and wherein each temperature in the second set corresponds to a second different one of the respective regions of the substrate;

a patterning system to form a first and a second pattern of alignment features at the first different respective regions of the substrate having the measured first set of temperatures during an exposure of the substrate and at the second different respective regions of the substrate having the measured second set of temperatures during a subsequent exposure of the substrate;

a metrology system to measure a first and a second set of spatial distributions of the first and the second pattern of alignment features of the substrate occurring during a measurement of the first and the second set of temperatures; and [[;]]

a calculating system to calculate a dimensional response from differences between measurements of the first set of spatial distributions and measurements of the second set of spatial distributions.

34. (Previously Presented) The lithographic apparatus of claim 33, wherein the substrate is a reference substrate which is one of a class of substrates having similar physical characteristics and which are to be processed in a lithographic apparatus,

wherein the spatial distribution of the alignment features of the reference substrate is measured when the reference substrate is supported on a substrate support of the lithographic apparatus,

wherein a member of the class of substrates is subsequently placed on the substrate support,

wherein the temperature of the substrate supported on the substrate support is measured at each of a plurality of regions distributed across a substrate surface, and

wherein the substrate is processed based on a correlation of a change in the substrate dimensions and a dimensional response model derived from the reference substrate.

35. (Previously Presented) The lithography system of claim 33, wherein the first and second patterns have a same nominal spatial distribution with a nominal offset between the two patterns and the dimensional response model is derived from differences between nominal and measured offsets between features of the two patterns.